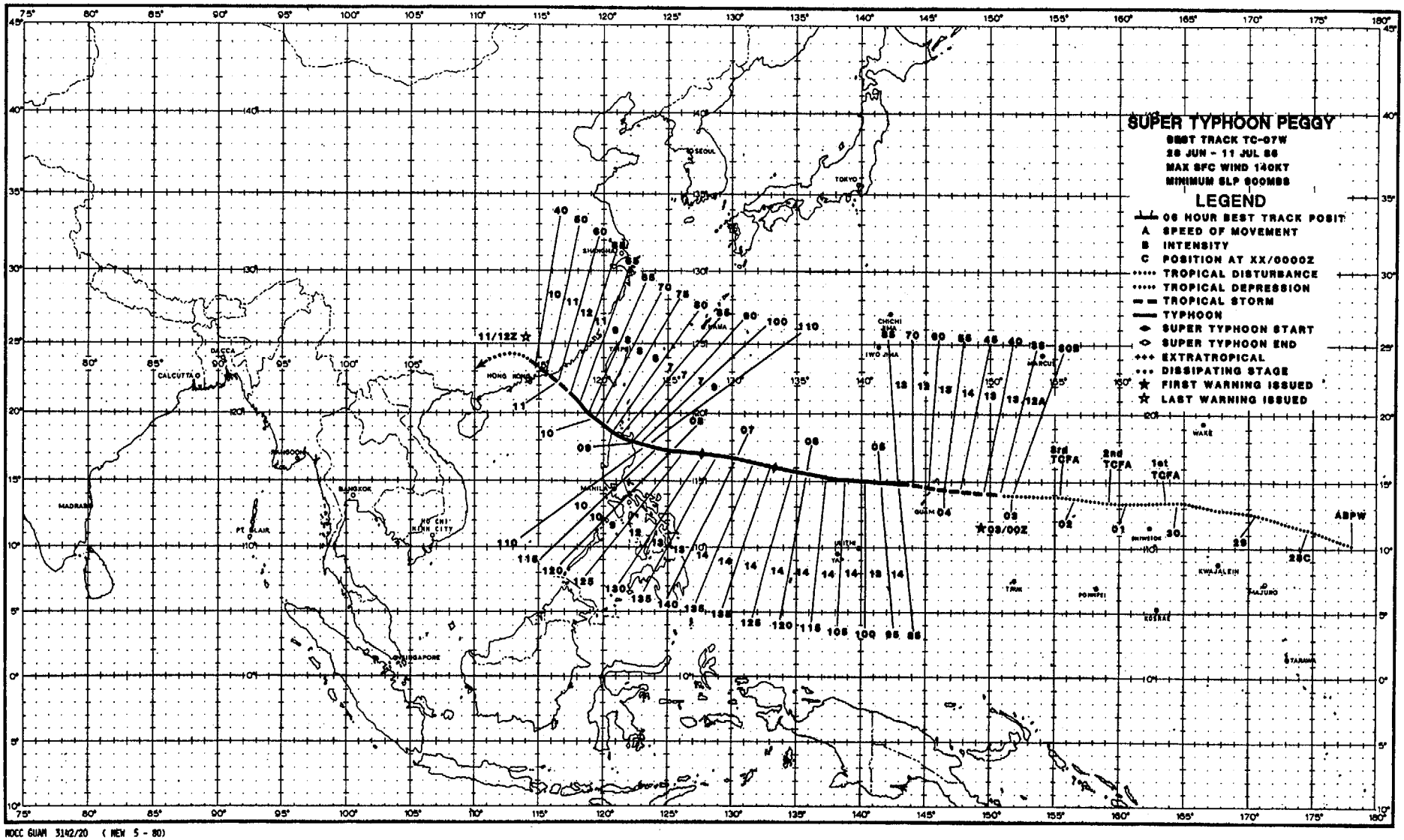

NOCC GUAM 3142/20 (NEW 5 - 80)

Peggy was the second super typhoon of the 1986 WESTPAC season. With the help of the Theta-E intensity forecast technique, intensity errors were kept to a minimum. In contrast, forecast track problems arose due to erroneous guidance from the One-way Interactive Tropical Cyclone Model (OTCM) which had a consistent northward bias at 72-hours.

During the latter part of June, the low-level, low-latitude tropical easterlies between the eastern Caroline Islands and the International Dateline were weaker than normal. In this area between the equator and 10 North Latitude, the light and variable winds, in conjunction with the tropical easterlies to the north, formed a vortex 600 nm (1111 km) east of Kwajalein Atoll in the Marshall Islands. It was first mentioned on the 270600Z June Significant Tropical Weather Advisory (ABPW PGTW) after satellite imagery showed persistent convection had developed. The circulation moved west-northwestward for six days before reaching tropical storm intensity (35 kt (18 m/sec)) 350 nm (648 km) east of Guam. Throughout this period the cloud signature caused heightened concern for Guam, however aircraft reconnaissance flights did not locate any supporting strong winds. At 030000Z July, JTWC issued its first warning on Tropical Depression 07W based on maximum winds of 25 kt (13 m/sec) from synoptic reports and the potential for intensification near Guam. Twelve hours later Peggy was upgraded to a tropical storm, when aircraft reconnaissance found a band of 35 kt (18 m/sec) surface winds displaced 20-40 nm (37-74 km) northwest of the vortex center.

Continuing to move west-northwestward, Peggy passed 58 nm (107 km) north of Guam at 040700Z. Peak winds experienced on Guam were 28 kt (14 m/sec) with gusts to 48 kt (25 m/sec). There was limited damage to Guam, restricted primarily to power poles and crops. The islands of Rota, Tinian and Saipan experienced more extensive damage - primarily to crops.

During the period 042352Z to 062040Z, Peggy's mean sea-level pressure (MSLP) dropped from 973 mb to 900 mb - a decrease of 73 mb. This corresponds to a drop of approximately 1.6 mb/hour which is classified

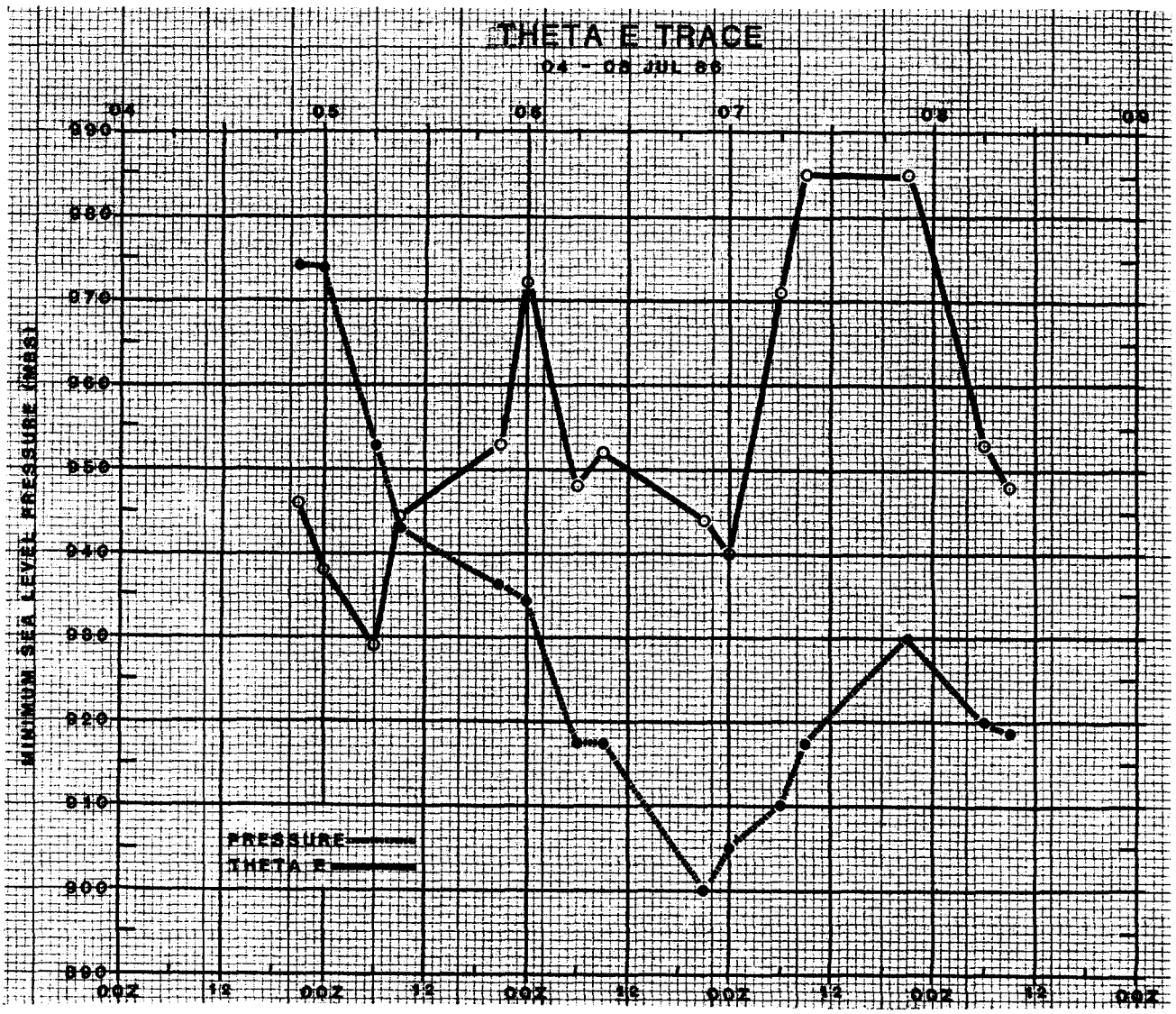

Figure 3-07-1. Plot of Peggy's central minimum sea-level pressure and the Theta-E line with the intersection at 050800Z. Rapid deepening occurred with a 1.6 mb/hour drop in central pressure from 973 mb to 900 mb.

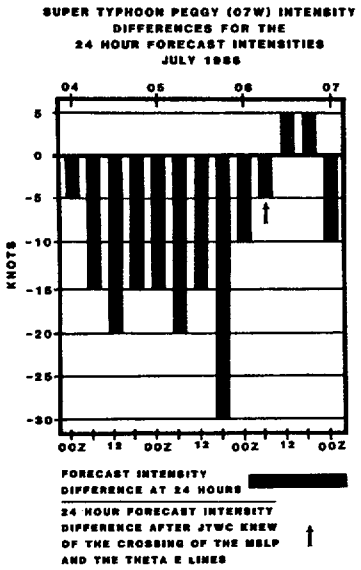

Figure 3-07-2. A graph of the difference between the actual best track intensities and the 24-hour forecast intensities before and after JTWC knew the sea-level pressure and Theta-E line intersected (reference Figure 3-07-1).

as rapid deepening (Holliday and Thompson, 1979). The rate of deepening does not meet the 2.5 mb/hour criterion used to define explosive deepening. As mentioned earlier, JTWC was able to significantly decrease forecast intensity errors, with the guidance provided by Theta-E intensity forecast technique (Dunnavan, 1981). The technique uses equivalent potential temperature (Theta-E), calculated from aircraft recon 700 mb temperature and dew point reports, as a measure of the tropical cyclone's thermodynamic energy. When the plots of Theta-E and MSLP intersect near the critical values of 950 mb and 360 degrees Kelvin, central pressure can be expected to drop to below 925 mb. Figure 3-07-1 shows the plot of Peggy's Theta-E and MSLP values during the period 042050Z to 080856Z. The intersection point is at 050800Z. The graph of the 24-hour forecast intensity (Figure 3-07-2) demonstrates the difference before and after the knowledge of the Theta-E crossing. The average 24-hour forecast intensity error before 050600Z (the first foreknowledge of increased potential for explosive or rapid deepening) was 16 kt (8 m/sec). The average 24-hour forecast intensity error after 050600Z was 5 kt (3 m/sec). With regard to 48-hour forecast intensities, only one warning benefited because two days after 050600Z, Super Typhoon Peggy's intensity peaked at 140 kt (72 m/sec).

Figure 3-07-3 shows Super Typhoon Peggy at its maximum intensity. Peggy remained on the west-northwestward track and slammed into northern Luzon at 082200Z with 95 kt (49 m/sec) surface winds. Newspaper accounts of Peggy's fury reported ninety-three people died, 16 were missing, over 116,000 families were homeless, and damage was estimated at 2.5 million dollars. Most of this damage, primarily to crops and villages, was the result of torrential rain. Also, two people lost their lives in southern Taiwan.

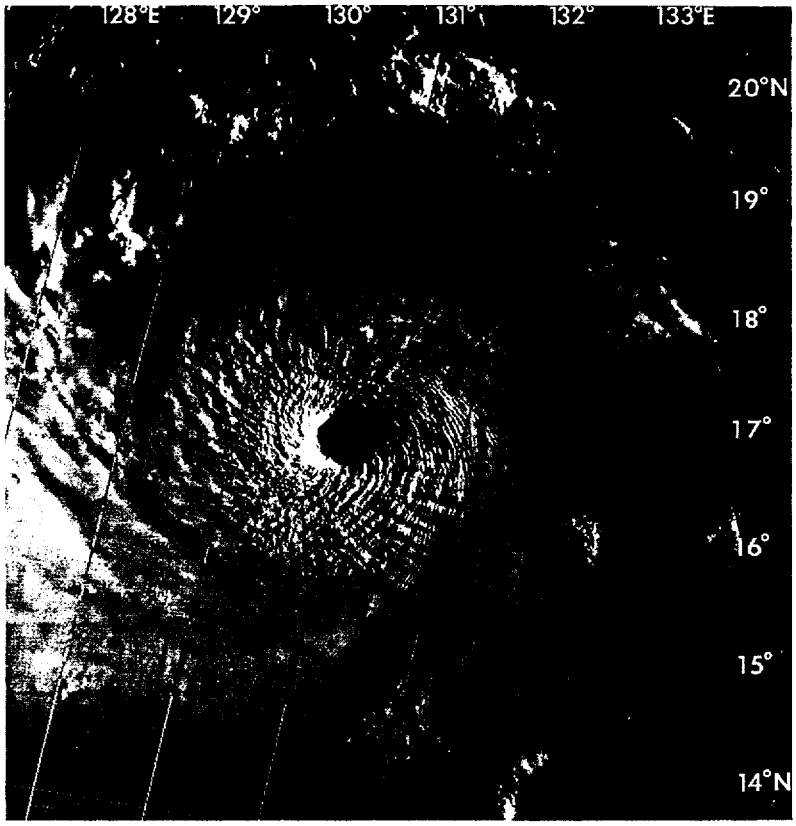

Figure 3-07-3. Super Typhoon Peggy at maximum intensity of 140 kt (72 m/sec) (062120Z July DMSP visual imagery courtesy of H and HS Weather, MCAS Futenma).

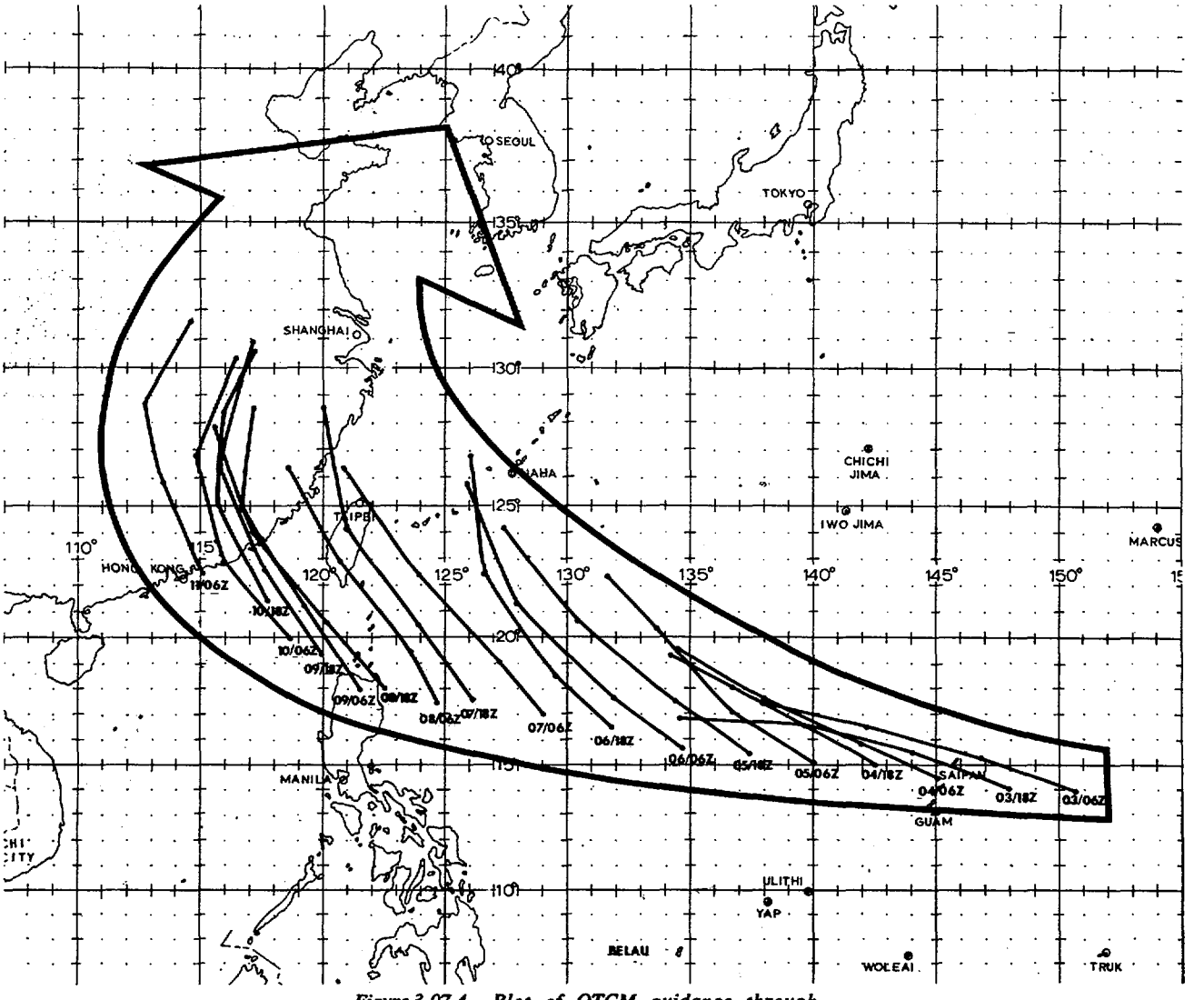

Figure 3-07-4. Plot of OTCM guidance through 72-hours for each twelve hour period. Note the continuous northward bias from the loci of initial points.

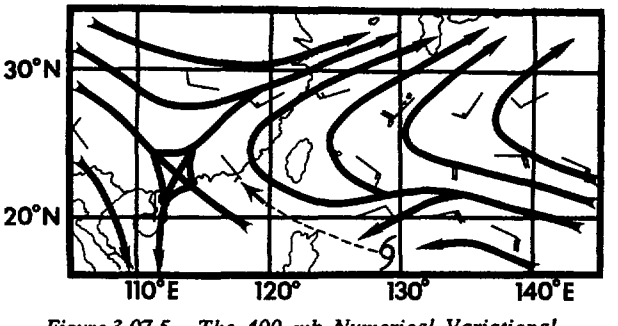

Figure 3-07-5. The 400 mb Numerical Variational Analysis (NVA) for 071200Z July with Peggy's position. The effect of the subtropical ridge can be implied from the plot of the final best track.

After crossing northern Luzon and moving into the South China Sea, Peggy continued to slowly weaken. It made landfall over southern China 80 nm (148 km) east of Hong Kong at 110200Z with an intensity of 55 kt (28 m/sec) Widespread flooding resulted across southern China and over 200 people were reported dead.

The track forecasts from the first warning through the 21st warning (at 080000Z) repeatedly called for a more northerly track than was observed. Guidance from the OTCM hinted at recurvature (Figure 3-07-4). Initially the NOGAPS prognoses, 021200Z to 060000Z, indicated slow weakening of the subtropical ridge poleward of Peggy. However, from 061200Z through 120000Z the NOGAPS prognoses reversed this trend and began slow ridge building. Although NOGAPS suggested a stronger subtropical ridge, guidance from OTCM persistently called for a more northerly track. The 400 mb NVA analysis at 071200Z (Figure 3-07-5) shows the location of the ridge and Peggy's ultimate track.